EMERGENCY SHORE PROTECTION PROJECT

DETAILED PROJECT REPORT

SYLVIA STATE BEACH
OAK BLUFFS, MASSACHUSETTS

US Army Corps
of Engineers
New England Division

SYLVIA STATE BEACH EMERGENCY SHORE PROTECTION PROJECT
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DETAILED PROJECT REPORT

Department of the Army
New England Division, Corps of Engineers
Waltham, Massachusetts 02254-9149

June 1992

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EXECUTIVE SUMMARY

This report was prepared by the New England Division of the U. S. Army, Corps of Engineers, under the authority of Section 14 of the Flood Control Act of 1946, as amended. The study was initiated in response to a request from the Board of Selectmen of the town of Oak Bluffs, Massachusetts.

Sylvia State Beach is located in Dukes County on Martha's Vineyard Island. The beach is bordered by Nantucket Sound to the east, Sengekontacket Pond to the west and inlets to the pond on the north and south. Sylvia State Beach is approximately 6,500 feet long, of which 1,200 feet on the northern end is the study area. The study area begins at the southern end of an existing groin field. Located on the backshore of the beach, between the beach and the pond, are Beach Road and a bicycle path which run the length of the beach and are the direct routes between Oak Bluffs and Edgartown. Both are heavily traveled, particularly during the summer tourist season. As a result of damages inflicted on the roadway and the increasing need to close the road during severe storms, the town of Oak Bluffs requested the Corps' assistance in solving the erosion problem there.

A second problem exists in this area and that is the water quality in Sengekontacket Pond. Shoaling of the inlets has created a circulation problem in the pond which has caused the water quality to degrade to the extent that, according to Town officials, it is now effecting the shellfish catch in the pond. The pond was dredged in 1978, which resulted in an increase in the shellfish catch in 1979. The shellfish catch has decreased steadily since that time. The pond was closed to shellfishing a number of times in the past two years, due to fecal contamination.

Three alternatives were investigated for the detailed project study, they included:

Plan 1: a breakwater
Plan 2: a bulkhead
Plan 3: extension of the existing groin field and dredging of Sengekontacket Pond with placement of material on beach.

All three alternatives would eliminate damages to Beach Road and the benefits realized are based upon elimination of associated costs (detours). Plans 1 and 2 would not help alleviate the contamination problem in the pond, and would also be inconsistent with the current nature of the shoreline. Plan 3 would provide new beach space, and the dredging of the pond would help alleviate the problem in the pond which would result in an increase in the shellfish catch.

An economic analysis was undertaken to determine the feasibility of a Federal project at Sylvia State Beach. The benefits of the project were determined based on elimination of the need for detouring around the area when the road is lost to erosion. The result of the economic analysis was that there were sufficient benefits to justify further Federal involvement in the project. The benefits of the alternatives outweighed the costs for all

three alternatives. Plan 3, which has the largest Benefit-to-Cost Ratio and the highest net annual benefits, is the recommended plan.

Plan 3 includes the extension of the existing groin field by the construction of two groins (100 feet and 75 feet in length). The new groins will act as a transition zone to eliminate the shadowing effect of the existing groin field while at the same time, the shortness of the proposed groins will assure that a shadowing effect is not felt further to the south. Also included in Plan 3 is the dredging of an estimated 25,000 cubic yards of material from Sengekontacket Pond and disposal of the dredged material on Sylvia State Beach.

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INTRODUCTION

This report was prepared by the New England Division, Corps of Engineers at the request of the Board of Selectmen of the town of Oak Bluffs, Massachusetts. The town, in a letter dated December 4, 1989, requested assistance in developing a long term solution to the ongoing erosion problems they are experiencing along this portion of shoreline. The Sylvia State Beach study area is located in Dukes County on the island of Martha's Vineyard, approximately seventy (70) miles southeast of Boston, Massachusetts and fifty (50) miles east of Providence, Rhode Island. The shoreline of Sylvia State Beach faces east into Nantucket Sound. The beach is bordered by Nantucket Sound on the east, Sengekontacket Pond on the west, and two inlets (north and south). (See Vicinity Map, Figure 1.) Sylvia State Beach is approximately 6,500 feet long. The study area is about 1,200 feet long and begins at the southern limit of a groin field located on the northern portion of the beach. (See Location Map, Figure 2.) Beach Road and a bicycle path run the length of Sylvia State Beach and are direct routes between Oak Bluffs and Edgartown. Both the roadway and the bicycle path are heavily traveled, especially during the summer tourist season.

STUDY AUTHORITY

This report was prepared under the authority of Section 14 of the Flood Control Act of 1946, as amended.

Under the provisions of Section 14, funding is available for the protection of highways, bridges, public works and public use facilities from shoreline erosion. Such work must be economically justified and advisable in the opinion of the Chief of the U. S. Army Corps of Engineers. Federal participation under Section 14 is limited to $500,000.

STUDY PURPOSE AND SCOPE

The purpose of this study is to determine the justification for Federal involvement in the construction of shoreline protection to prevent the loss of a portion of Beach Road along Sylvia State Beach.

This report presents estimates of damages which would occur from continued erosion if no Federal project were constructed. The intent of this effort is to determine whether Federal involvement should proceed to the preparation of plans and specifications based on an appraisal of Federal interest. This was accomplished through an analysis of alternative plans of improvement. This effort encompassed engineering feasibility, costs, and economic justification and environmental considerations.

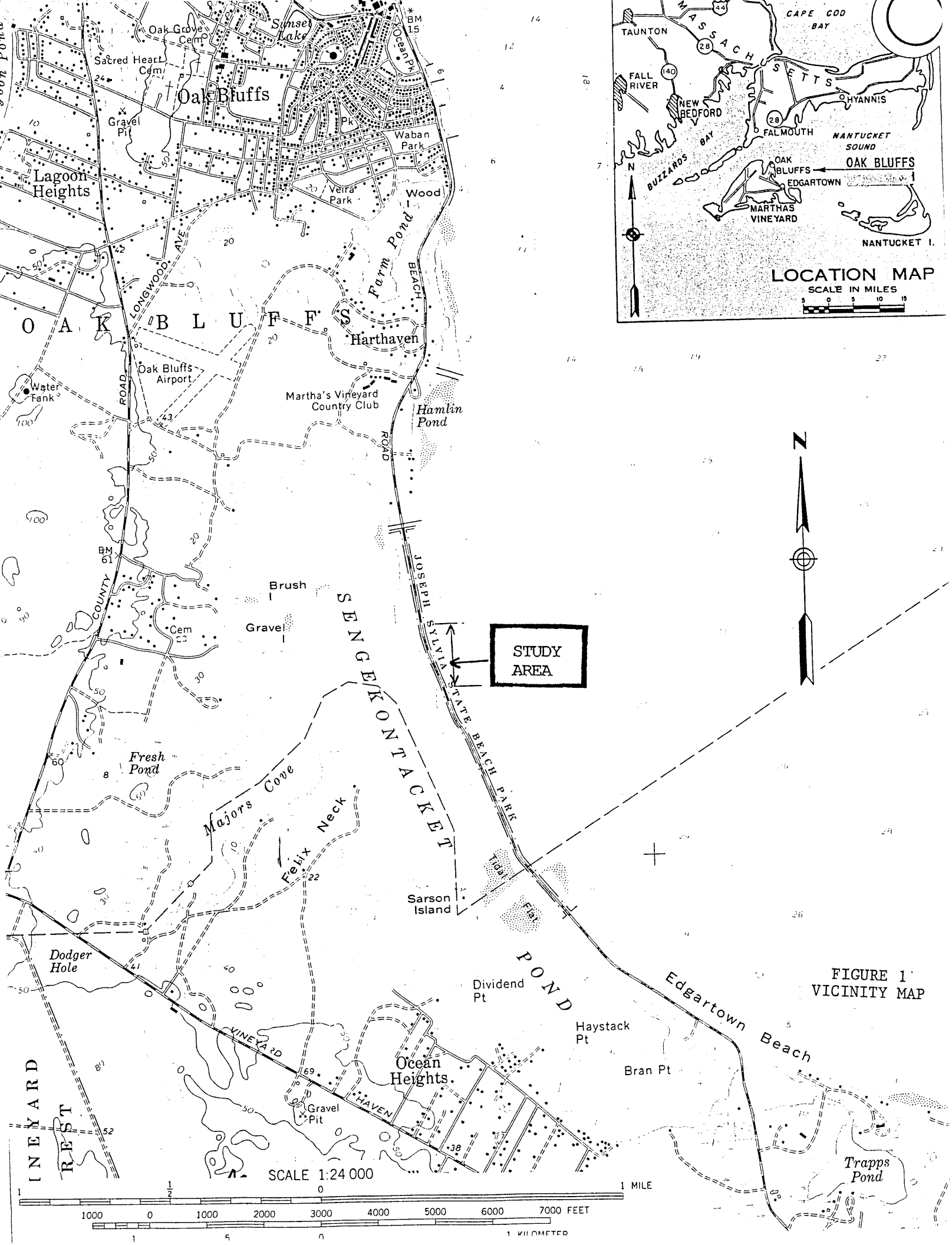


FIGURE 1
VICINITY MAP

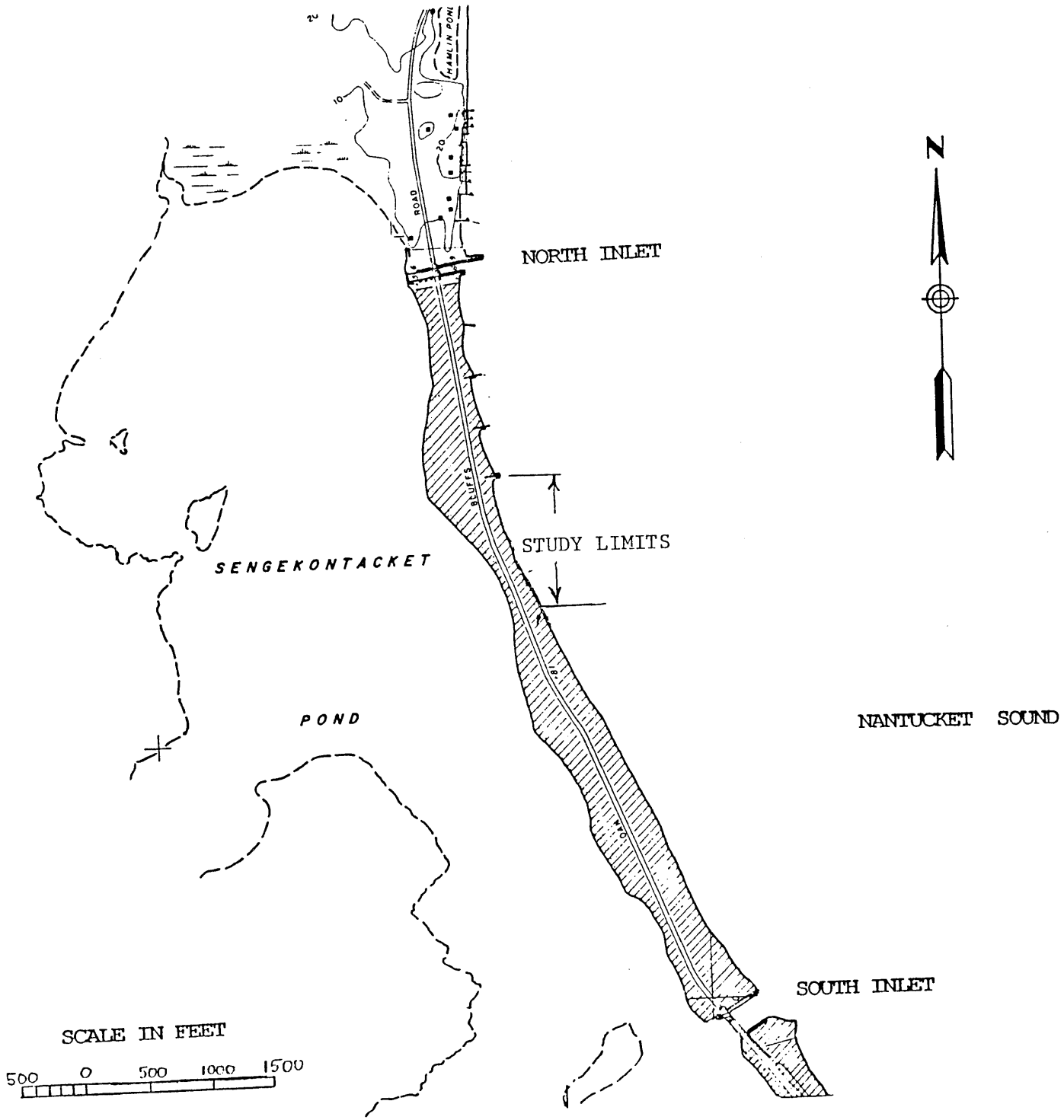


FIGURE 2
LOCATION MAP

PRIOR STUDIES & IMPROVEMENTS

1) 1937 - Construction of two stone jetties and a timber pile bridge at the north inlet to Sengekontacket Pond by the Commonwealth of Massachusetts. The jetties are 160 and 85 feet long, respectively north and south. The bridge is 36 feet wide.

2) 1954 - Four stone groins constructed by the Commonwealth of Massachusetts. The groins are spaced approximately 400 feet apart. The groin system has effectively stabilized the shoreline in most of this area.

3) 1961 - Two stone jetties were constructed by the Commonwealth of Massachusetts at the south inlet to Sengekontacket Pond. The north jetty is 400 feet long and the south jetty is 200 feet long.

4) 1965 - Beach Erosion Control Report Cooperative Study of Martha's Vineyard, Massachusetts, U.S. Army Corps of Engineers - New England Division. A study to determine the most practicable method of restoring and stabilizing the beaches and bluffs between East Chop and Edgartown Harbor. Numerous recommendations were made in this report, however, none of the recommendations pertained to the study area.

5) 1970's - According to representatives of the town, the northern jetty of the southern inlet to Sengekontacket Pond was extended by the Commonwealth of Massachusetts (the length of the extension was not known).

6) 1989 - "Jersey" type concrete barriers were placed along the roadway for a distance of approximately 200 feet to prevent further deterioration of the shoulder of the roadway. This work was performed by the Commonwealth of Massachusetts.

PLAN FORMULATION

EXISTING CONDITIONS

The study area is approximately 1,200 feet long and is located at the northern end of a large state beach. The backshore of the beach contains Beach Road, the main travel route between Oak Bluffs and Edgartown, as well as a bicycle path and Sengekontacket Pond. At the northern limit of the state beach is a groin field containing four groins. The study area begins at the southern limit of this groin field and continues for 1,200 feet to an area where sufficient dry beach space provides protection of the backshore areas. According to a 1965 Corps study of this area, the three northernmost groins are 150 feet in length and the southernmost groin is 125 feet in length. They were constructed by the Commonwealth in 1954 and are spaced about 400 feet apart. The 1965 report also stated that "...The groin system is serving to effectively stabilize the shore." Local officials have stated as recently as the spring of 1990 that the shoreline within the groin field is relatively stable.

Littoral movement along Sylvia State Beach is from north to south and sand sources for the beach are from areas to the north. However, numerous shore protection structures from East Chop to Sengekontacket Pond have eliminated a large amount of beach building materials. This has a negative

effect on the shoreline at Sylvia State Beach. The littoral drift accounts for the formation of fillets along the north side of the groins and jetties, which cause a lack of beach material buildup in the shadow of these structures. This situation is apparent south of the last groin. Further evidence of littoral movement is at the South Inlet to the pond. The north jetty at this inlet was extended from its original length of 400 feet to 600 feet approximately 15 years ago. The beach in this area has experienced significant seaward movement, presumably due to the jetty extension.

Comparison of the shoreline prior to the construction of the groins in 1954 and 34 years later in 1988 reveals numerous changes. The shoreline has accreted significantly from the south jetty at the North Inlet to the second groin. This accretion over the 34 year period ranges from about 1.5 to 2.5 feet per year. Between the second and third groins, a fillet has formed just north of the third groin with slightly less erosion occurring in the shadow of the second groin. The same type of formation is found between the third and fourth groins. The downdrift area beyond the fourth groin is where the worst shoreline erosion has occurred and where the study area begins. Erosion rates within the study area are approximately 3.0 feet per year. However, recent observations show the erosion rate from 1977 to 1988 to be only 1.0 feet per year.

Extensive erosion has occurred within the study area. The most critical portion is an area of the roadway which has already been undermined just south of the last groin. Portions of the shoulder of the roadway have been washed out creating an unstable and potentially dangerous situation. Photos 1 and 2 show the same area just south of the fourth groin in 1989 (Photo 1) and 1990 (Photo 2). Hurricane Bob in August 1991 and a major northeastern storm in October 1991 caused additional damage to the roadway, including the loss of most of the pavement in the area in question. The area was repaved in early 1992 and sandbags were placed along the roadway to prevent further losses.

WITHOUT PROJECT CONDITIONS

Further loss of material will lead to the eventual closure of the roadway, creating detours of traffic onto alternative local roads. The detour length from Oak Bluffs to Edgartown is approximately 2.5 miles longer than the direct route along Beach Road. (Oak Bluffs to Edgartown along Beach Road is approximately 5.5 miles.) The assumed detour route is shown on Figure 3.

PROBLEMS AND OPPORTUNITIES

There are two main problems effecting the Sylvia State Beach area. They are the erosion of the Beach Road and the shoaling of Sengekontacket Pond. A detailed discussion of these problems follows.

PHOTO 1 - STUDY AREA IN 1989

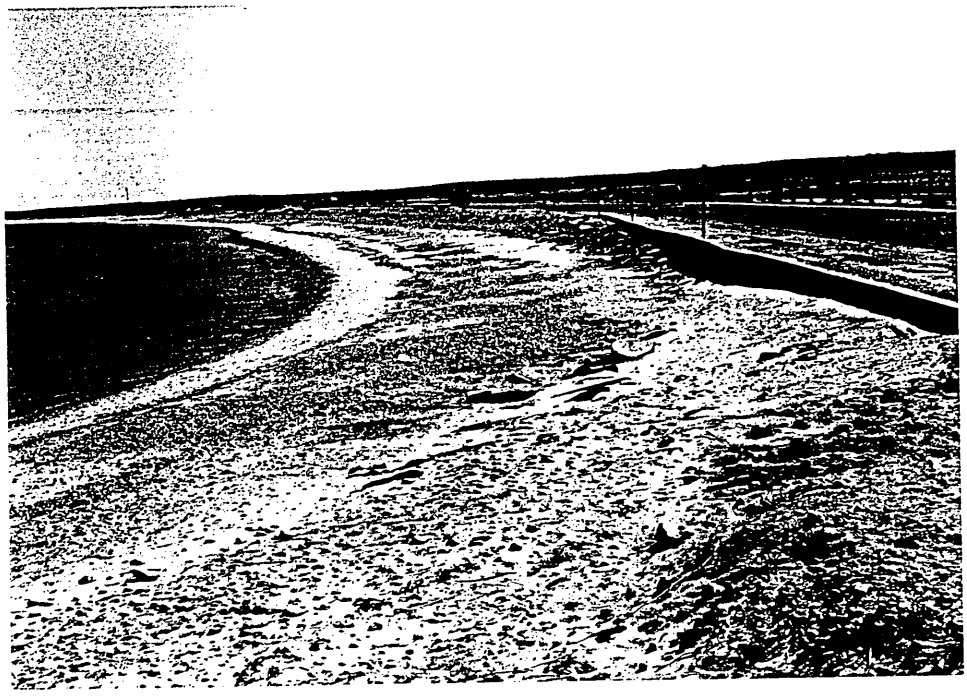


PHOTO 2 - STUDY AREA IN 1990

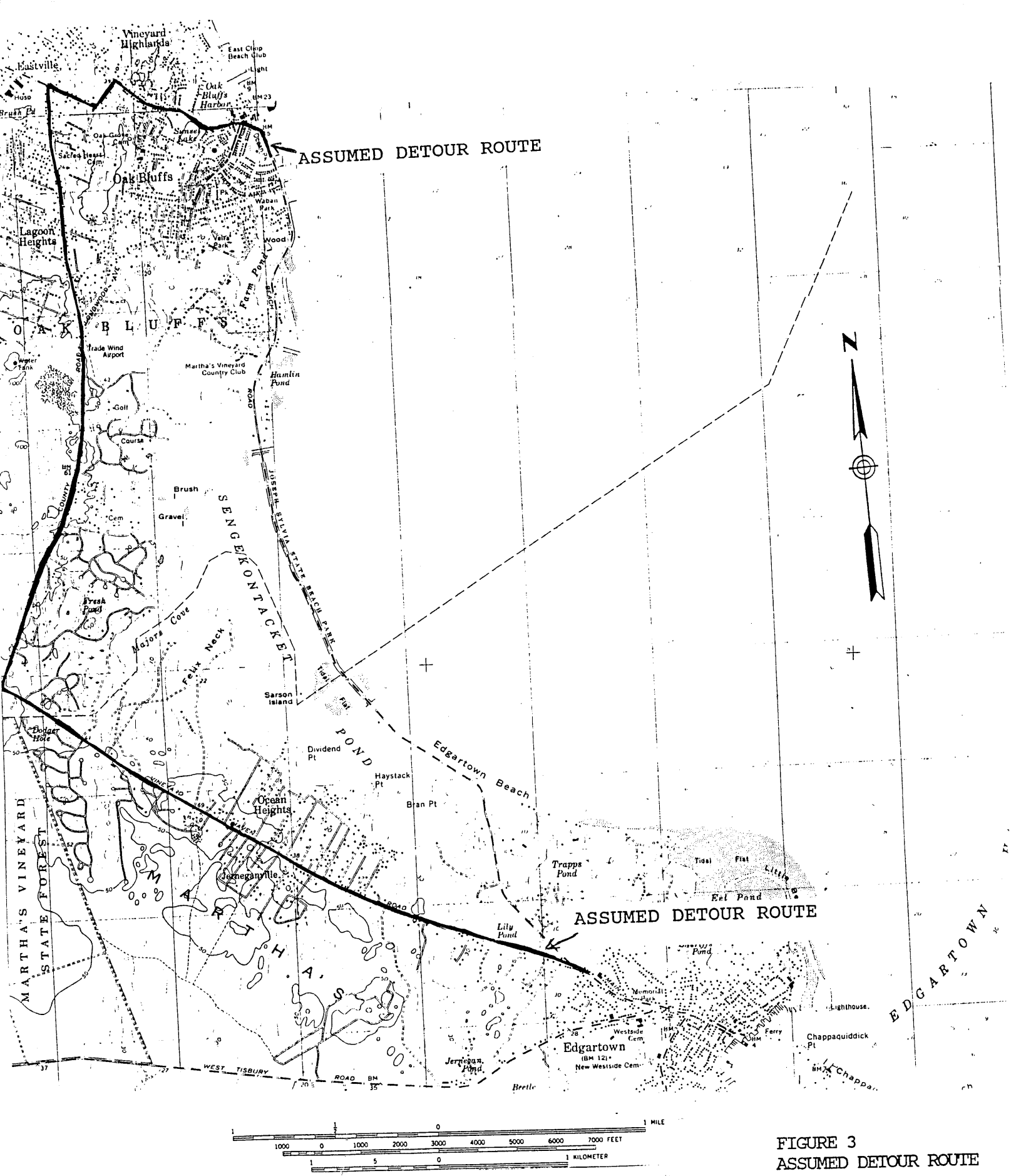


FIGURE 3
ASSUMED DETOUR ROUTE

Severe erosion along the study area threatens Beach Road. According to local officials, erosion is most severe during northeast storms. Beach Road is a major route between Oak Bluffs and Edgartown. The road is a paved two-lane highway with a large shoulder used by bathers and windsurfers for parking along the beach. There is also an adjoining bicycle route separated from Beach Road by a wood guardrail. (See Photo 3.) Both transportation routes are heavily traveled, particularly during the summer tourist season. The average erosion rates for the study area ranges from 1.0 to 3.0 feet per year. This is exacerbated by the presence of the last groin which blocks littoral drift. This eliminates the possible buildup of beach material in this area.

The highway is subjected to overtopping during storms by high tides and wave attack. The most recent closure of the highway occurred in the fall of 1991. Abnormally high tides coupled with high winds and waves resulted in the erosion and closure of the roadway.

The second problem is the water quality of Sengekontacket Pond. Town officials claim that the water circulation into the pond is inadequate and does not provide proper flushing of the pond. This limits shellfish harvesting. According to town officials, Sengekontacket Pond has shoaled to the point of causing severe contamination due to poor water circulation. Photo 4 shows the shoaling of the north inlet into the pond. The pond was closed to shellfishing for half of the summer of 1988 and most of the summer of 1989. Town officials have suggested the possibility of disposing the dredged material onto the beach as a form of shore protection. Dredging of the pond's inlets and a channel is investigated in this report.

PLANNING OBJECTIVES AND CONSTRAINTS

Planning objectives are identified based upon the problems and opportunities identified for this area. The main planning objective for this emergency shore protection project is to prevent the loss of the roadway in a timely manner thereby eliminating the need for further detours and repairs to the roadway, while at the same time assuring that the project does not cause problems to down drift areas.

Planning constraints are natural, structural or institutional conditions which impose restrictions on the range of solutions available to meet the planning objectives described above. The main constraint for work in this area is the limitations placed on structural improvements by the aggressive Coastal Zone Management practices in the Commonwealth of Massachusetts.

ALTERNATIVE PLANS

Various alternative plans to alleviate the erosion problem being experienced at Sylvia State Beach were formulated and evaluated for this study. The alternative plans considered include:

PHOTO 3 - BICYCLE PATH AND GUARDRAIL ADJACENT TO BEACH ROAD

PHOTO 4 - SHOALING OF NORTH INLET TO SENGEKONTACKET POND

Plan 1: This plan includes an offshore breakwater, approximately 900 feet long and located approximately 500 feet offshore.

Plan 2: This plan consists of a concrete bulkhead with stone toe protection running the length of the area in question.

Plan 3: The elements of this plan are the extension of the existing groin field and placement of sandfill along the entire study area. Also investigated is the dredging of Sengekontacket Pond, in order to reduce the shoaling problem and the use of the dredged material on the beach.

EVALUATION OF ALTERNATIVE PLANS

ENGINEERING ANALYSIS

The purpose of a breakwater, Alternative 1, is to reduce the wave impact on the shoreline thus reducing the erosion rate. The breakwater considered is 900 feet long and located approximately 500 feet offshore. The breakwater would be 10 feet high and would have a top width of 6 feet. The breakwater alternative would not be consistent with the shoreline in the area. It would most likely not be acceptable under the Commonwealth of Massachusetts Coastal Zone Management policy and does not provide for environmental enhancement from dredging the pond.

The bulkhead alternative, Alternative 2, also does not provide environmental enhancement associated with dredging Sengekontacket Pond. Implementation of this plan would still result in damaging storm waves impinging directly on the roadway at the shoreline since the Mean High Water line would not be moved further offshore. Furthermore, erosion and scour of the beach may be increased by wave reflection off the structure. The bulkhead analyzed has a top elevation of 14 feet MLW, it would have a width of 2 feet and a footing with a base width of 7 feet and a height of 2 feet. It would be fronted by stone toe protection. This alternative creates no usable beach and would be out of character with the surrounding shoreline, and would be inconsistent with Coastal Zone Management policy.

Alternative 3 includes dredging material from the channels and inlets in Sengekontacket Pond with disposal along a 1,200 foot section of the shore at Sylvia State Beach, which is experiencing erosion. (See Figure 4.) Also included with this plan is the extension of the existing groin field located north of the northern limit of the study area. The extension of the groin field will be accomplished by the construction of two transitional groins to reduce the shadowing effect caused by the existing groin field while at the same time eliminating the possibility of a shadowing effect occurring south of the southern study limit as a result of the new groins. The two groins will be progressively shorter than the existing groins. In this manner, the groins will trap some of the material moving to the south, while at the same time allowing a sufficient quantity of material to pass the groin field. Design plans for this alternative were provided by the Commonwealth of Massachusetts, Department of Environmental Management.

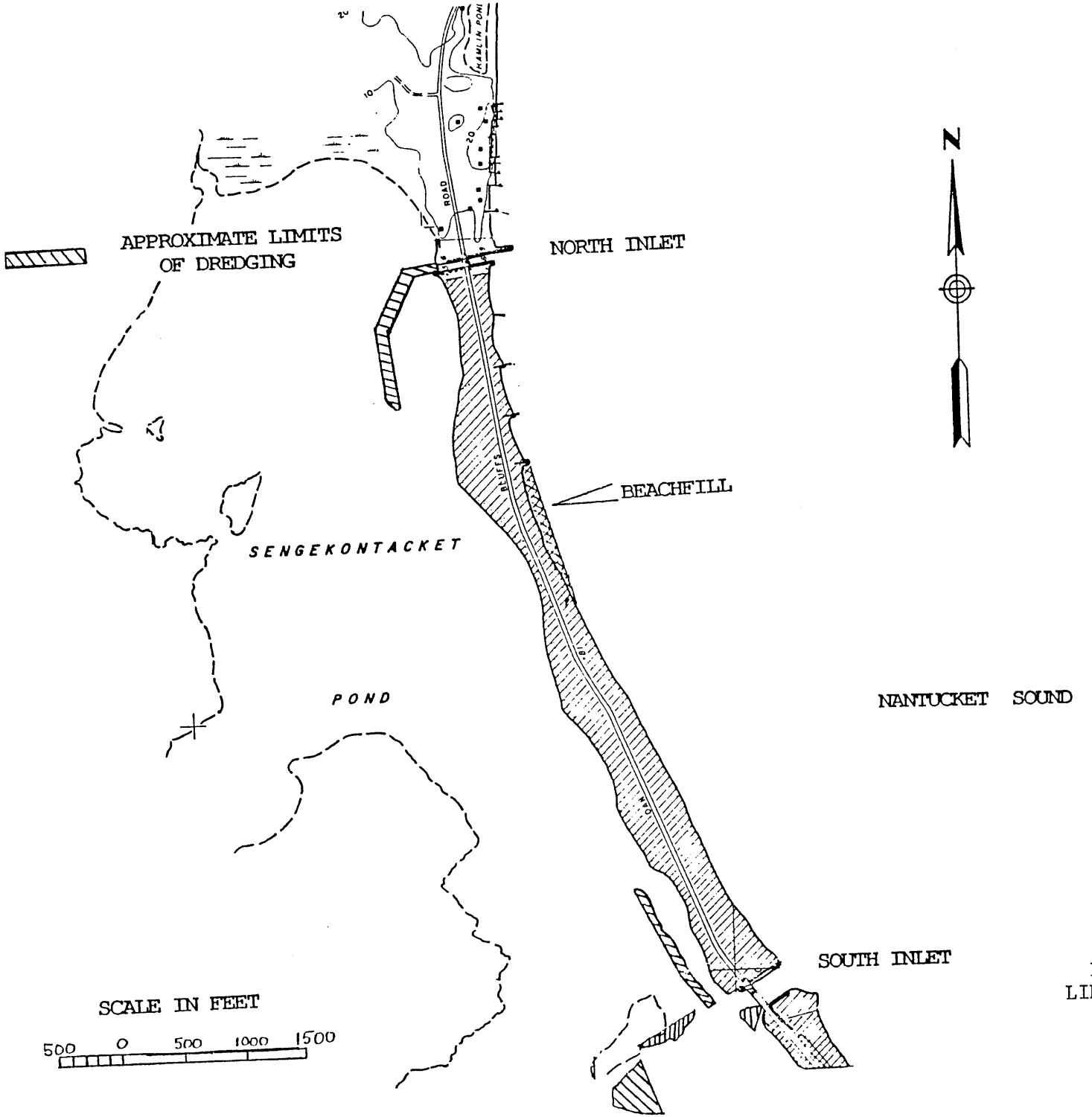


FIGURE 4
LIMITS OF WORK

ESTIMATE OF BENEFITS

For purposes of this analysis, the without project condition and the no action condition are considered the same, that is the loss of Beach Road. All traffic would then be routed along the detour route shown in Figure 3. The detour requires approximately 2.5 miles of additional travel between Oak Bluffs and Edgartown.

The proposed shore protection project would prevent the loss of Beach Road and eliminate the need for the detour. The benefits, therefore, are based upon the savings realized by the elimination of the detour. (See Economic Appendix for details of benefit calculations.)

It is estimated that with the loss of the road, there would be 2,198,160 vehicle trips detoured annually. The average number of passengers per car is estimated at 1.5 and the total detour time is 0.07 hours. Using an operating cost per vehicle of $0.20/mile and an hourly value for leisure time of $3.93, the following costs for the detour are estimated:

Operating Cost:		
2,198,160 trips x $0.20/mile x 2.5 miles =		$1,099,080
Time Cost:		
2,198,160 trips x 1.5 people/car x $3.93/hr x 0.07 hrs =		$ 907,071
TOTAL ANNUAL DETOUR COST		$2,006,151
	SAY	$2,006,200

Since the alternative plans would eliminate the need for the detour, the total annual detour cost described above is equal to the annual benefits for the project. Table 1 presents a comparison of Alternative Plans.

ENVIRONMENTAL CONSIDERATIONS AND FINDINGS

It is anticipated that dredging of the inlets to the pond will enhance water circulation. This will in turn increase levels of dissolved oxygen, nutrients, and salinity, which will all enhance shellfish propagation.

Potential Environmental Enhancement - Assuming the sand used to protect the beach is obtained from dredging the inlets and a channel in Sengekontacket Pond, the project would improve water circulation in the pond and thus improve the productivity of the shellfish beds. Historical shellfish harvest data shows the productivity of Sengekontacket Pond after dredging had taken place in 1978 increased significantly for years 1 through 7 and then returned to its original pre-dredging level after shoaling reoccurred. Table 2 shows shellfish harvest data obtained from the Oak Bluffs Shellfish Constable. An Environmental Assessment (EA) is currently being prepared by New England Division. At this time earlier efforts by the Commonwealth of Massachusetts obtained permits necessary for the dredging portion of this work. The permits granted limit that work to between December 31 and April 1. In an effort to complete construction in a timely manner consistent with the permit requirements, the EA will be completed in conjunction with the preparation of Plans and Specifications.

TABLE 1
COMPARISON OF ALTERNATIVE PLANS

Alternative Plan	Initial Cost	Annual Costs	Annual Benefits	Net Annual Benefits	Benefit-Cost Ratio
(Plan 1) Breakwater	$ 832,500	$ 88,700	$2,006,200	$1,917,500	23 TO 1
(Plan 2) Bulkhead	$ 553,900	$ 75,600	$2,006,200	$1,930,600	26 TO 1
(Plan 3) Sandfill & Groins with Dredging	$ 480,000	$ 73,500	$2,006,200	$1,932,700	27 TO 1

TABLE 2
SENGEKONTACKET POND SHELLFISH CATCH

YEAR	SCALLOPS		CLAMS		QUAHOGS		MUSSELS	TOTAL	LICENSES		
	Com	Rec	Com	Rec	Com	Rec	Rec		Com	Rec	Senior
1975	629	277	-	-	-	-	-	906	100	582	
1976	694	10	-	38	136	254	-	1132	116	570	
1977	753	179	-	43	205	386	2	1568	43	530	
1978	1438	272	-	51	653	363	5	2782	123	470	
1979	3565	793	65	124	1345	570	-	6462	157	428	183
1980	2515	285	-	82	488	385	10	3765	132	479	207
1981	2329	414	-	70	288	468	12	3581	42	454	223
1982	2294	346	-	58	384	408	-	3490	45	419	207
1983	3717	623	-	48	275	376	-	5039	54	385	240
1984	1253	370	-	40	49	316	37	2065	36	353	240
1985	1027	306	-	57	131	359	49	1929	33	348	214
1986	171	69	8	61	316	483	14	1122	13	327	240
1987	366	250	23	51	151	383	-	1224	18	332	254
1988	253	71	14	40	104	314	-	796	17	301	219
1989	124	185	29	45	154	289	-	826	19	234	203
1990	0	64	281	61	493	260	-	1159	16	279	213

NOTE: Dredging was completed in the spring of 1978.
Note increase in scallop harvest after dredging.

Data obtained from the Shellfish Constable for Oak Bluffs.

DESCRIPTION OF SELECTED PLAN

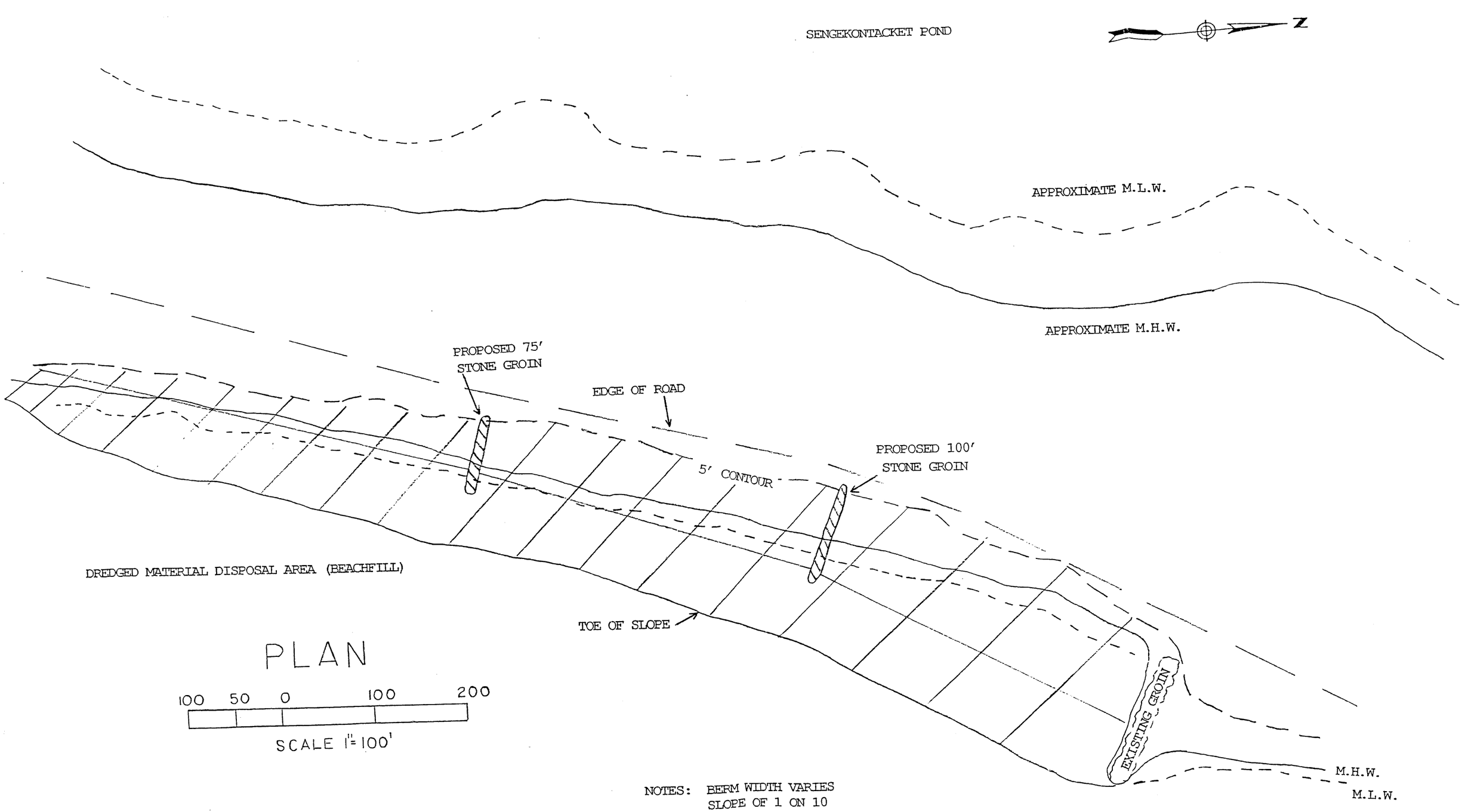
Extension of the existing groin field to include the study area, combined with sandfill, is a logical solution to the ongoing erosion problems. The addition of sandfill would provide a wider protective beach seaward of the roadway. As stated previously, plans used for purposes of this analysis were provided by the Commonwealth of Massachusetts, Department of Environmental Management. Updated plans will be prepared by the Corps of Engineers during the Plans and Specifications stage. As a result of structures to the north of the study area, the northern inlet and areas further north, the study area is being starved of natural nourishment materials. The groin field to the north of the study area has already stabilized the shoreline at that point. As was described in the Existing Conditions Section, the area to the south of the existing groin field is experiencing erosion due to the shadowing effect caused by the structures to the north. The purpose of the proposed groins is to trap additional material, in order to reduce the amount of material loss which occurs due to littoral transport.

The proposed groins will be 100 feet and 75 feet long, respectively. (See Figure 5.) Their cross sectional dimensions would be similar to the existing groins further north. This plan extends the groin field further south to provide shoreline stabilization. However, the proposed groins will be increasingly shorter than the groins to the north, thus allowing the new groins to trap some sand, but also allowing sand to pass to the south. This will ensure that shadowing effects of the groins (blocking littoral transport) will not be moved further south along the beach, creating a similar problem in a new location.

Removal of the existing groin field, at the northern end of Sylvia State Beach would not serve to correct the problem, since the original purpose of the groin field was to reduce the amount erosion being experience in that area. Due to the existence of structures to the north of Sylvia State Beach, removing the existing groins would only succeed in moving the erosion problem further north, increasing the possibility of undermining of the bridge at the north end of the area.

Without the proposed groins, the area will continue to experience accelerated erosion and would require a sizeable quantity of periodic nourishment on a more frequent basis. It is estimated that with the proposed groins, periodic nourishment of approximately 12,500 cubic yards would be required every 5 years. This could increase or decrease depending upon the number and intensity of storms experienced in the area during the time period. Without the groins, it is likely that 12,500 cubic yards would be required on a more frequent basis. If the material is not available to dredge, the sandfill would have to come from an alternative site. The alternative site would mean the material would be more expensive. In addition to the increased unit cost for the material, more material would be required on a more frequent basis. This would all contribute to a more expensive project.

In order to provide for the possible environmental enhancement of the pond, one possible solution is to dredge a portion of the pond and its inlets. This solution is dependent on the following criteria:



NOTES: BERM WIDTH VARIES
SLOPE OF 1 ON 10

FIGURE 5
BEACHFILL AND GROIN
CONSTRUCTION

1) The quality of the sand must be suitable for stabilization of the beach and protection of the roadway.

2) The quantity of suitable material which is dredged must be sufficient for providing sandfill for the beach.

Environmental enhancement associated with dredging the pond are contingent upon maintenance dredging at least every 7 years. This is based on shellfish harvest estimates which are affected by dredging and water circulation in the pond. The estimated 5 year renourishment cycle estimated for beach maintenance with the groins in place would be consistent with this estimated dredging cycle.

If there is not sufficient quantity of material in the proposed dredging areas, additional sources of sandfill will be required. One possible source would be sand and gravel operations in the area. Another source of sand, particularly for renourishment, would be the south end of the beach north of the north jetty. This area of the beach is considerably wider than other areas of Sylvia State Beach due to the jetty blocking littoral movement. It may be feasible to take the sand from this area and place it where it is required to widen other portions of the beach. Table 3 presents the Annualized Costs and Benefit-Cost Ratio for Plan 3.

SUMMARY OF LOCAL INVOLVEMENT

The town of Oak Bluffs, Massachusetts formally requested assistance in a letter dated 4 December 1989. Since that time the Corps representatives have held several meetings with Federal, State and local officials.

The Commonwealth of Massachusetts will be the official sponsor of the proposed work and members of the Massachusetts Department of Environmental Management will sign the Local Cooperation Agreement (LCA) prior to construction. A letter of intent from the State, indicating their willingness to support the project and meet the required items of local cooperation, are included in Appendix C. Table 4 shows a breakdown of projected Federal and Non-Federal costs for the proposed plan.

The draft Local Cooperation Agreement (LCA) indicates that the local sponsor will:

a. Provide without cost to the United States, all lands, easements, rights-of-way, and utility relocations necessary for project construction.

b. Hold and save the United States free from damages due to the construction, operation and maintenance of the project, except where such damages are due to the fault or negligence of the United States or its contractors.

c. Provide 100 percent of the cost of groin maintenance, presently estimated at $1,700 annually.

TABLE 3

ANNUALIZED COSTS AND BENEFIT-COST RATIO
FOR SELECTED PLAN

ITEM	COST
Sandfill and Dredging	$ 207,500
Groin Construction	83,700
SUBTOTAL	$ 291,200
Contingencies	72,800
SUBTOTAL	$ 364,000
Pre-Construction, Engineering & Design	85,000
Construction Management	31,000
INITIAL COST	$ 480,000
Periodic Nourishment	$1,515,000
TOTAL PROJECT COST	$1,995,000

ANNUAL COSTS

Interest & Amortization (8 1/2%, 50 Yr. Project Life)	$ 41,500
Groin Maintenance	$ 1,700
Annual Dredging and Beach Renourishment *	$ 30,300
TOTAL ANNUAL COST	$ 73,500

NOTE: * - This cost is based upon dredging 12,500 cy every 5 years and placing the dredged material on the beach.

Total Annual Benefits	$2,006,200
Total Annual Costs	$ 73,500
Benefit-Cost Ratio:	27 TO 1

TABLE 4

BREAKDOWN OF FEDERAL AND NON-FEDERAL COSTS FOR SELECTED PLAN

FEDERAL COST		
Pre Authorization Cost (Study)		$ 50,000
75% of Initial Construction Cost		$ 360,000
75% of Periodic Nourishment (up to $500,000 limit)		$ 90,000
	TOTAL	$ 500,000
NON-FEDERAL COST		
25% of Initial Construction Cost		$ 120,000
25% of Periodic Nourishment (100% beyond Federal limit)		$1,425,000
	TOTAL	$1,545,000

NOTES:

Federal expenditures limited to $500,000

Federal funds available for nourishment

$500,000 - $410,000 = 90,000

Nourishment is considered a construction cost and is cost shared in the same proportions as the First Cost. Based upon estimated nourishment of 12,500 cy every 5 years, at an annual cost of $30,300, the Federal government would participate in less than one renourishment in year 5 and the remaining renourishment over the 50 year economic life of the project would be a Non-Federal responsibility.

d. Prevent future encroachment which might interfere with proper functioning of the project.

e. Comply with Title VI of the Civil Rights Act of 1964 (78th Stat. 241) and Department of Defense directive 5500.11 issued pursuant to and published in Part 300 of Title 32, Code of Federal Regulations.

f. Assume responsibility for all costs in excess of the Federal cost limitation of $500,000.

g. Provide 25 percent of the total project costs (excluding pre-authorization study costs), including necessary project lands, easements and rights-of-way. The Non-Federal contribution for initial construction cost is currently estimated at $120,000. Periodic nourishment is considered a construction cost and is cost shared at the same percentage as the initial construction cost. The current estimate for periodic nourishment is $30,300 per year. As a result of the Federal cost limitation noted in item f above, the Non-Federal share of the periodic nourishment for the 50 year economic life of the project is $1,425,000. The Non-Federal share of the total project costs is $1,545,000.

CONCLUSIONS

The erosion problem at Sylvia State Beach in Oak Bluffs, Massachusetts has been studied, and alternatives to alleviate this problem have been formulated. Based on reconnaissance level engineering, economic, and environmental study and review of the problem, the most cost effective plan for solving the problem in the area is Plan 3, construction of 2 groins, dredging of Sengekontacket Pond and placing the dredged material on the beach.

RECOMMENDATION

I recommend that this report be approved at the basis for preparation of plans and specifications and construction of the recommended plan, under the authority of Section 14 of the Flood Control Act of 1946, as amended. I further recommend that approval be granted to allow the New England Division, Division Engineer to be designated as the approval authority for the construction plans and specifications.

The recommendations contained herein reflect the information available at this time and current Department policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program

16 June 92
Date

James K. Hughes
Lt. Colonel, Corps of Engineers
Division Engineer

ACKNOWLEDGMENT AND IDENTIFICATION OF PERSONNEL

This report was prepared under the supervision and management of the following New England Division personnel:

Lt. Colonel James K. Hughes, Division Engineer
Joseph L. Ignazio, Director of Planning
Paul E. Pronovost, Chief, Plan Formulation Division
John T. Smith, Chief, Coastal Development Branch

This report was developed and prepared by John Kedzierski and Catherine O. LeBlanc, Project Managers. Project team members included: Catherine Demos and Jay MacKay, Environmental; Karen Umbrell, Economics; Robert Simeone and Albert Lemire, Coastal Engineering; and Kathleen Atwood, Archaeology.

The information provided in this report was obtained from numerous sources, including the Town of Oak Bluffs, specifically Roger Wey, Selectman, and Richard Madeiros, Shellfish Constable.

APPENDIX A

ECONOMIC ANALYSIS

Economic Analysis

The purpose of this appendix is to evaluate the economic benefits of preventing the erosion of Sylvia State Beach and the washout of Beach Road in Oak Bluffs, Massachusetts. The town of Oak Bluffs is located on the northeast corner of Martha's Vineyard, an island off the southern coast of Cape Cod. Beach Road is the primary travel route between the towns of Oak Bluffs and Edgartown, two of the main commercial and tourist centers on the island. Beach Road runs along Sylvia State Beach, a long, narrow beach on the northeastern shore of the island.

All benefits and costs in this analysis are stated in January, 1992 prices and are converted to present value equivalents based on the fiscal year 1992 federal interest rate for water resources projects of 8 1/2 percent.

The study area consists of a 1200 foot section of Sylvia State Beach where erosion is threatening Beach Road. Sylvia State Beach is exposed to the open ocean and is subject to erosion, particularly during severe storms. Erosion of the beach has consistently been a problem in the past, and a large portion of the beach contains a system of groins to limit erosion. However, a section of the beach beyond the groin system, located south of the southernmost groin, has eroded to such a point that Beach Road is threatened. In the recent past, Beach Road has been closed by the town several times after storms washed large amounts of sand over the road. The town has also placed jersey barriers along the edge of the road and has dumped large stones and fill on the beach side of the jersey barriers in order to prevent complete loss of the road. However, the town is trying to find a more permanent solution to the erosion problem.

The economic resource that is immediately endangered is Beach Road in Oak Bluffs, Massachusetts. According to traffic count data provided by the Martha's Vineyard Commission, traffic counts for the Oak Bluffs area of Beach Road show an average of 9165 vehicle trips per day on the road in the peak season summer months, and an average of 5951 vehicle trips per day in the off-season, winter months. The road area does not contain any underground water or other utility lines.

For the purpose of this analysis, the without project condition and the no action condition are considered to be the same. With no action, Beach Road would be lost. With the loss of Beach Road, all traffic which previously traveled on Beach Road would have to be re-routed. Based on the existing system of roads in the area, it was determined that the most likely detour route would consist of a 2.5 mile detour along alternate roads.

With a federal shoreline protection project, the washout of Beach Road would be prevented, and traffic would not have to be detoured. The economic value of Beach Road is estimated by valuing the costs of the traffic detour which would occur with the loss of Beach Road. The costs of the traffic detour include both increased vehicle operating costs incurred due to the increased travel distance required with the detour, and the time lost by passengers due to the increased travel time required with the detour.

The variable cost of operating a private vehicle has been estimated by New England Division at $.20 per mile. The time of passengers is valued at one-third of the current average hourly wage of a Massachusetts production worker in manufacturing of $11.78, one-third of which is $3.93. The number of vehicles detoured are estimated using the average daily vehicle counts obtained from the Martha's Vineyard Commission of 9165 vehicles trips per day in the summer and 5951 vehicles trips per day in the winter. For the purpose of this analysis, it is assumed that the summer months consist of June, July, August and September, and the winter months consist of the remaining eight months of October through May. However, since a portion of the vehicles which travel Beach Road in the summer months are traveling to Sylvia State Beach, and since these vehicles would likely no longer travel the route if the road were lost and the beach no longer accessible by the road, only 70 percent of the total summer vehicle count, or 6416 vehicle trips per day, are counted in this analysis as vehicles which would be detoured in the summer months.

Based on the above traffic count information, there would be a total of 2,198,160 vehicle trips detoured annually without the project. This figure is calculated as shown below:

Winter: 5951 trips/day X 8 months X 30 days/month = 1,428,240 trips
Summer: 6416 trips/day X 4 months X 30 days/month = 769,920 trips
Total # Vehicle Trips Detoured Annually = 2,198,160 trips

Table 1, below, shows a summary of the assumptions used in calculating the cost of the traffic detour.

Table 1
Detour Cost Assumptions Summary

Detour	2.5 miles
Total # Vehicle Trips Detoured	2,198,160 trips/year
Average Vehicle Speed	35 miles/hour
Total Time of Detour	.07 hour
Summer Vehicle Count	9165 vehicles/day
% Summer Vehicles Detoured	70%
# Summer Vehicles Detoured	6416 vehicles/day
Winter Vehicle Count	5951 vehicles/day
% Winter Vehicles Detoured	100%
Variable Operating Cost per Mile	$0.20
Hourly Value of Leisure Time	$3.93
Average # Passengers per Vehicle	1.5

The total annual cost of the detour is calculated based on the assumptions in Table 1. The total annual increased vehicle operating cost with the detour equal $1,099,080. The total annual increased time cost with the detour equal $907,071. These costs yield a total annual detour cost of $2,006,151. The calculations for these figures are shown below:

Operating Costs: 2,198,160 trips X $0.20/mile X 2.5 miles = $1,099,080
Time Costs: 2,198,160 trips X 1.5 people/car X $3.93/hr X.07 hr = $907,071
Total Annual Detour Cost = $2,006,151

SAY $2,006,200

With a federal shoreline protection project, Beach Road would be protected, and the traffic which currently travels on Beach Road would not have to be detoured. With a project, and the detour costs calculated above would be prevented. Thus, the total annual benefits to the project equal $2,006,151, the total annual value of the detour costs which would prevented with the project.

In order for a proposed project to be considered economically justified, it must have a benefit to cost ratio of at least 1.0 to 1. Project costs are detailed in the main report. The total annual costs of the project equal $73,500. The total annual benefits, annual costs, benefit-cost ratio, and net annual benefits of the proposed project are shown below.

Annual Benefits	Annual Costs	Benefit to Cost Ratio	Net Annual Benefits
$2,006,200	$73,500	27 to 1	$1,932,700

APPENDIX B

ENVIRONMENTAL ASSESSMENT
(Under Preparation)

APPENDIX C

PERTINENT CORRESPONDENCE

Town of Oak Bluffs, Massachusetts
Selectmen
P. O. Box 1327
Oak Bluffs, Mass. 02557

JESSE B. LAW III
Chairman
ROGER W. WEY
GEORGE G. MARTIN

Telephone (508) 693-5511

DECEMBER 4, 1989

DANIEL M. WILSON
COLONEL, DIVISION ENGINEER
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DIVISION
424 TRAPELO ROAD
WALTHAM, MA 02254-9149

DEAR COLONEL WILSON,

THIS LETTER IS TO SEEK THE ASSISTANCE OF THE U.S. ARMY CORPS OF ENGINEERS REGARDING A SERIOUS EROSION PROBLEM ON OUR COAST.

BEACH ROAD IS LOCATED ON A BARRIER BEACH BETWEEN NANTUCKET SOUND AND SENGEKONTACKET POND. THE NANTUCKET SOUND SIDE HAS ERODED TO THE POINT WHERE THE ROADWAY IS THREATENED. EROSION IS MOST SEVERE DURING NORTHEAST STORMS, AND MOST THREATENING AT A POINT SOUTHEAST OF THE FURTHEST SOUTH OF A GROIN SYSTEM. THE GROINS AND LONG JETTY PROTECTING AN INLET TO THE NORTH HAVE STARVED THE NARROW PORTION OF SEDIMENT, TRANSPORT BEING ROUGHLY FROM A NORTH TO SOUTH DIRECTION. THE SENGEKONTACKET POND SIDE HAS SHOALED IN TO THE POINT OF SEVERE POLLUTION PROBLEMS FROM POOR CIRCULATION. THE POND WAS CLOSED TO SHELLFISHING FOR HALF OF THE SUMMER OF 1988 AND MOST OF THE SUMMER OF 1989. THIS POND HAS HISTORICALLY PROVED TO BE A MAJOR SOURCE OF SHELLFISH.

DREDGING OF THE POND WOULD PROVIDE BOTH REMEDIATION OF THE INTERIOR CIRCULATION PROBLEMS AND NOURISHMENT FOR THE ERODED PORTION OF BEACH. IN ADDITION, WE ARE SEEKING A LONG TERM SOLUTION TO THE SUPPLY PROBLEMS CAUSED BY THE JETTY AND GROIN SYSTEM.

OUR REQUEST WAS PRECIPITATED BY DISCUSSION AT A NOVEMBER 21 MEETING ATTENDED BY SELECTMAN ROGER WEY AND SEVERAL ARMY CORPS OF ENGINEERS STAFF MEMBERS. ASSISTANT CHIEF PLANNER NICK AUTGES, GEOLOGIST MARK HABEL AND CIVIL ENGINEER JOHN T. SMITH WERE IN ATTENDANCE AND EXAMINED THE ISSUES IN GREATER DETAIL.

WE BELIEVE THAT THE EXPERIENCE AND RESOURCES OF THE ARMY CORPS OF ENGINEERS COULD BE OF GREAT VALUE TO THE TOWN IN THIS SITUATION. WE WOULD WELCOME ANY ASSISTANCE WHICH YOU MAY BE ABLE TO PROVIDE. THANK YOU FOR YOUR CONSIDERATION.

SINCERELY,
BOARD OF SELECTMEN

JESSE B. LAW III

ROGER W. WEY

GEORGE G. MARTIN

DEC 11 1989

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Management

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(617) 740-1600
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~~Bureau of~~
~~Coastal Engineering~~
Office of
Waterways

April 29, 1992

Board of Selectmen
Town of Oak Bluffs
P. O. Box 1327
Oak Bluffs, MA 02557

Re: Edgartown/Oak Bluffs - Sylvia Beach Erosion

Gentlemen:

The Corps of Engineers are continuing work on the above-referenced project and we anticipate the construction phase to begin during the winter of 1992-3. Enclosed are copies of draft Detailed Project Report, including the economic analysis and environmental concerns.

The local sponsors are responsible to obtain the Order of Conditions, M.E.P.A. Certifications, Chapter 91 and any other local permit for the project. The Corps of Engineers will obtain the Water Quality Certification and the CZM Consistency Statement. A federal or Corps permit will not be necessary as the Corps of Engineers will be the contract agency.

As you are aware these permits have already been obtained by this agency for the dredging portion of the project, however, some modification to the existing permits may have to be made to reflect an increase in the quantity of material and the locations to be dredged. Also, permits for the groins will be necessary.

To accomplish these tasks, it is suggested that the Department enter into an agreement with the municipalities, utilizing the municipal funds currently retained by the Department from previous contract work along with Department funding not exceeding seventy five (75) percent of the cost of the proposed work.

Engineering proposals should be requested to cover the following Scope of Work:

1. Review the Corps' Proposed Project as described in the attached documents

2. Review the existing permits

3. Prepare and submit applications for modification to the dredging and groin construction to the following agencies:

Edgartown Conservation Commission
Oak Bluffs Conservation Commission
Executive Office of Environmental Affairs - MEPA Unit
Department of Environmental Protection - Chapter 91 Permit
Martha's Vineyard Commission

The estimated cost of the work is approximately $5,000.00. However, during the permit process, some concerns may be expressed about the groins proposed by the Corps. I believe the Corps' study has addressed these issues but we may have to expand their information to satisfy these concerns. The cost of this work cannot be estimated at this time, however, I would suggest that we set the agreement ceiling at $10,000.00.

Please review this information and I will contact your office within ten (10) days so we can initiate action prior to June 30, 1992.

Very truly yours,

Eugene F. Cavanaugh
Director

EFC/mel
Enclosures

cc: Peter C. Webber, Commissioner
Paul Pronovost, Corps of Engineers

THE MARTHA'S VINEYARD COMMISSION

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May 14, 1992

Mr. Joseph L. Ignazio
Director of Planning
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

re: Joseph Silvia State Beach
protection study

Dear Mr. Ignazio:

This is in response to your letter dated 1 May 1992, regarding the proposed conducting of a Section 14, Emergency Shoreline Protection Project at Joseph Silvia State Beach in the Town of Oak Bluffs, Massachusetts.

The Martha's Vineyard Commission and its staff are very much aware of the proposed plan of action and of the existing problems that such a proposal is intended to eliminate.

Past dredging and beach nourishment proposals have all received the endorsement of the Commission and the staff has always been available to work very closely with the proponents of such undertakings, be they federal, state or local agencies. All have been intended to address the two major issues in the area: loss of a productive shell fishery due to shoaling, poor circulation and high bacterial counts, and the reduction of a public beach as a recreational resource through sevère erosion. In conjunction with this erosional threat comes the potential loss of a major component in Island transportation infrastructure, namely the Beach Road.

The roadway serves as a vital link between the Towns of Edgartown and Oak Bluffs and any resultant severing of this linkage would add considerably to the travel time between towns, in particular, travel times associated with emergency vehicles.

The Commission has long supported the removal of materials from both the channel areas of Sengekontacket Pond as well as from the inlet areas to provide vastly improved circulation and a rejuvenation of the excellent shellfishing that previously existed in the area. Additionally, the depositing of these materials back

onto the shoreline and beach area from whence they came to renourish a resource that is most important to visitors and residents alike, a safe, clean recreational bathing beach, has been a long term goal of the Commission as witnessed in the adopted Island Regional Plan.

While the Commission and its staff recognize the need for urgent action to alleviate the present situation, it is also important to develop a long-term maintenance program for the area. It is hoped that all parties involved, state, federal and local, will, in addition to the current proposal, strive to develop a long-term, permanent management and maintenance program that will aid in preventing the present perilous state from reoccurring in the future.

The staff at the Commission appreciates the opportunity to offer its comments on the proposed activity and is available to provide whatever assistance it may be called upon to give. If there are any questions please do not hesitate to call the office.

Yours very truly,

Charles W. Clifford
Executive Director

CWC/mlb

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Management

May 21, 1992

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~~Bureau of~~
~~Coastal Engineering~~
Office of
Waterways

Lt. Colonel James K. Hughes
U. S. Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02254-9149

Re: EDGARTOWN/OAK BLUFFS - Silvia Beach Renourishment and
and Sengekontacket Pond Dredging

Dear Lt. Colonel Hughes:

This letter is to reconfirm the support of the Department of Environmental Management for the proposed federal project to construct the groins and renourish the eroded area of Silvia Beach with dredged material from Sengekontacket Pond.

Commissioner Peter C. Webber of this agency and Commissioner James J. Kerasiotes, of the Massachusetts Highway Department, strongly urge your office to expedite the project as the temporary measures taken to date could not provide the protection to the roadway that the proposed project will provide.

We are processing a grant to the municipalities that will enable them to obtain engineering services to modify the current permits by incorporating work proposed by the Corps. We are also requesting funding for the state's share of the project to be in our fiscal year 1993 Capital Program. The funding will be available for the late fall or early winter construction period.

The Department of Environmental Management, acting through its Office of Waterways, will be the local sponsor for the project and we are prepared to use every means available to us to have the project completed as soon as possible.

Should you have any questions, please contact me at (617) 727-3160, ext. 529.

Very truly yours,

Eugene F. Cavanaugh
Director

EFC/mel